

## Outcomes of Preservice Teacher's Technology Use

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**Abstract:** At a time of scrutiny, when technology integration is being examined in teacher preparation programs, this article provides a closer look at technology use and its adoption by preservice teachers. Current technology integration models provide the framework of the importance of putting technology into the hands of the preservice teachers. Going one step further and taking a "learning with technology" stance, this study engaged preservice teachers in meaningful and effective uses of the AlphaSmart 3000® and enabled them to become active thinkers. Three major research questions were addressed: (a) Are there differences between actual and perceived success by pre-service teachers on traditional and technology delivered assessments? (b) When given the opportunity to learn and use technology, do such experiences impact the decision to use technology in their future classroom? and (c) Are performance scores positively or negatively impacted by the use of technology? The outcomes of this study provide insight to teachers' perceptions and use of technology.

**Keywords:** Assistive technology, Outcomes, Teacher education, Technology use, Preservice teachers' perceptions.

### Technology and Teacher Preparation: A Time of Scrutiny

For almost two decades, teacher education programs have been struggling to prepare teachers to use and integrate technology effectively into k-12 classrooms (Bausch & Hasselbring, 2004; Doering, Hughes, &

Huffman, 2003; Smith & Robinson, 2003). National reports (U.S. Congress, Office of Technology Assessment, 1988, 1995; National Center for Education Statistics, 2000) confirm less than desirable outcomes in efforts to integrate technology in university teacher education programs. In fact, lack of teacher training was one of the most frequently cited obstacles directly impacting the use of technology in today's schools (Bausch & Hasselbring; Doering et al.). In an attempt to accelerate universities' training efforts, the National Council for the Accreditation of Teacher Education (NCATE) and the International Society for Technology in Education (ISTE) have designed and adopted technology standards to prepare teachers to utilize technology (ISTE, 2000). Such standards provide a framework for integrating technology into teacher education courses.

Inherent in the standards set forth is the importance of teacher experience with new technology. Infusion must begin in teacher training. The purpose of this study was to add to the empirical support for a practice-based infusion model. Such a model requires that teachers be taught in authentic ways to infuse technology. As such this project provided direct support to pre-service teachers to learn by using the very technology they would later infuse into their own curricula.

### Technology Integration Models

Many teacher education programs are making efforts to integrate the ISTE/NCATE

technology standards within their programs. Yet, current research has not led us to a conclusive means on how this can be done effectively nor does it provide us with the ultimate technology integration model. Previous research allows us to examine factors within technology integration such as faculty and preservice teachers' skills levels and comfort in using technology, attitudes towards the use of computers, and confidence. Ertmer, Conklin, Lewandowski, and Osika (2003) believe that in order to translate technology skills into practice, preservice teachers require direction about how to use these skills to achieve meaningful learning outcomes within their curricula.

Although many technology integration models have been established (Doering et al., 2003; Ertmer et al., 2003), one common element of such models involves putting technology into the hands of the preservice teachers. Doering et al. believe that we must go one step further by adopting a learning-with-technology stance. Such a stance engages preservice teachers in meaningful and effective uses of technology and enables them to become active thinkers. Taking this stance requires emphases on four components: (a) technology tools can facilitate learning, (b) technology should be in the hands of the students, (c) students should learn with technology, and (d) preservice teachers should be able to generate future applications/strategies in their classroom (Doering et al., p. 343). Further, Doering et al. state that this perspective, which values discriminate thinking, is a paradigm shift that will not prove to be easy in teacher education. For this reason, there is great need to investigate through a simple research design the use and adoption of technology within this paradigm.

### **AlphaSmart 3000®**

The AlphaSmart 3000® is a rugged portable word processor that provides schools with an

affordable alternative to laptops. Its straightforward approach to word processing provides both teachers and students with a handy tool for integrating technology into classroom learning activities. In addition, the AlphaSmart 3000® assessment bundle provides a user friendly Quiz Designer that allows teachers to use and build test items. Teachers can choose a variety of formats and analysis to report their students' performance. Retrieval and scoring of quizzes are quick and automated.

Approximately 800,000 to one million AlphaSmart 3000® units are currently being used in our schools today (Russell, Bebell, Cowan, & Corbelli, 2002). Research conducted by Russell et al. involved observations in 50 classrooms. Findings demonstrated a clear increase in students' use of the AlphaSmart 3000® after each classroom was equipped with one of the devices per student. Thus, the AlphaSmart 3000® became the preferred tool for writing given that the 1:1 ratio led to changes in the way each teacher thought about and used technology with his or her class.

It is because of the aforementioned strength of the AlphaSmart 3000® that the researchers of this project selected its integration into their curricula and chose to investigate its effects on preservice teachers use and attitudes towards the tool.

### **Purpose**

The purpose of this study was to investigate the experiences undergraduate special education teacher majors had while using the AlphaSmart 3000® as part of their methods courses in reading and writing, and to see if current experiences would impact their future use of this piece of technology in their classrooms.

The research questions guiding the data collection and analysis included:

1. Are there differences between actual and perceived success by pre-service teachers on traditional and technology delivered assessments?
2. When given the opportunity to learn and use technology, do such experiences impact the decision to use technology in their future classroom?
3. Are quiz scores positively or negatively impacted by the use of technology?

## Method

### *Sample*

A sample of convenience was drawn from 37 pre-service Special Education majors enrolled in a required Reading and Writing Methods (EDIS 441) course at a Midwestern university. The sample (Mean age = 21.4 yrs) was comprised of 34 females and 3 males, of which 36 were white and 1 was African American.

### *Treatments*

The course, EDIS, has as its core component the development of skills in the teaching of reading and writing to k-12 students with disabilities. Skills taught in the course related to reading include, but are not limited to, increased reading fluency, rates, and comprehension. Skills taught in the class related to writing include, but are not limited to, spelling, sentence development and story development. Emphasis within the course focused on teaching techniques and devices to enhance skills related to reading and writing.

The course of study was team-taught using both traditional lecture/discussion format and a technology-rich environment that

emphasized the infusion of assistive technology (AT) techniques. During the course this project, there was specific emphasis on the use of the AlphaSmart 3000®.

### *Design*

This project employed a split-half design whereby the participants were divided into 2 sections and each group received both treatment and instructional styles equally throughout the semester. Each class period was 5 hours long and divided into two 2.5-hr segments according to treatment format. Group 1 was provided traditional lecture followed by the technology format, and likewise, Group 2 received technology followed by traditional treatment.

### *Data Collection*

This study employed a mixed-method approach to data collection and analysis. Quantitative data in the form of weekly quiz grades were obtained. Quizzes based on the text readings were designed using the same questions but alternating formats. Each week the groups were administered either a tradition paper/pencil quiz or one using the AlphaSmart 3000® technology. The format switched from week to week for each group. For example, in week one, Group 1 received the traditional quiz format and Group 2 the AlphaSmart 3000® quiz. During week two, Group 1 was given the AlphaSmart 3000® quiz and Group 2 the paper/pencil quiz format. The alternation continued each week throughout the semester.

Participants were also asked to complete a short survey about their perceptions. The survey, as can be seen in Figure 1, asked participants to rate their experience using the AlphaSmart for quizzes on a Likert scale (1 – not at all favorable; 7 – extremely favorable) and the likelihood they will use AlphaSmart

**Figure 1. End of semester survey for preservice teachers to share their technology use experience.**

Name \_\_\_\_\_

Date \_\_\_\_\_

AlphaSmart Survey							
1. Rate on a scale of 1-7 your experience of using the AlphaSmart for quizzes.							
<b>Circle one :</b> 1                      2                      3                      4                      5                      6                      7							
	Not all favorable	Strongly unfavorable	Somewhat unfavorable	Same as using Pen/ Paper	Somewhat favorable	Strongly Favorable	Extremely Favorable
2. Briefly describe your experience using the AlphaSmart for quiz taking.							
3. Do you think you performed better on the Alpha Quiz ? Circle One: [Yes or No] State one reason why you feel this way.							
4. Rate on a scale of 1-7 the likelihood of using the AlphaSmart for quizzes in your future classroom.							
<b>Circle one :</b> 1                      2                      3                      4                      5                      6                      7							
	Not all likely	Strongly unlikely	Somewhat unlikely	Same as using Pen/ Paper	Somewhat likely	Strongly likely	Extremely likely
5. Briefly state why or why not?							
6. As a teacher what strategies would you use to incorporate the Alpha Quiz successfully?							

3000<sup>®</sup> in their future classroom (1 – not at all likely; 7 – extremely likely). The survey also included qualitative follow-up questions regarding their experiences and perceptions of performance.

## Results

In response to research question #1 “Are there differences between actual and perceived success by pre-service teachers on traditional and technology delivered assessments?” we examined correlation data with regard to actual performance compared to perception of success on quizzes (see Table

1). Pearson correlation coefficients among the variables indicated that participant grade on the AlphaSmart version of the quiz was significantly correlated to their perception of performance. A positive correlation ( $r=.52$ ) was found between the participants’ AlphaSmart 3000<sup>®</sup> quiz grade and the rating they gave to their experience using AlphaSmart 3000<sup>®</sup> for quizzes.

To answer question #2, “When given the opportunity to learn and use technology, do such experiences impact the decision to use technology in their future classroom?” comparisons were also made between

**Table 1**  
**Correlation Coefficient Between Quiz Type and Perception**

Quiz Type	Perception of Performance (r)
Traditional	.11
AlphaSmart	.52*

\* Correlation is significant at the .01 level

questions regarding the likelihood the participants would use the AlphaSmart technology later in their careers and their quiz grades and experience. Pearson correlation coefficients for this question can be found in Table 2, a positive correlation ( $r=.34$ ) was found between a participants' score on his or her AlphaSmart 3000<sup>®</sup> quiz and the likelihood the student will use that technology later. Participants who did well on the quizzes responded positively that they would use that technology in the future. Similarly, there was a positive correlation ( $r=.52$ ) between quiz score and perception of experience. Not surprisingly, students who did well on their quizzes rated their experiences more positively.

This finding was also voiced in the written responses provided by the students. One student stated, "I enjoyed it tremendously; I used it in my practicum placement and will hopefully use it in my classroom." Another student stated,

Using the AlphaSmart 3000<sup>®</sup> for quizzes was definitely a different strategy. It allows for less

writing. It only displayed one question at a time, which was less overwhelming. I could see myself using it with a number of students in my classroom.

When asked "As a teacher, what strategies would you use to incorporate the Alpha Quiz successfully?" Those with a positive experience using the AlphaSmart 3000<sup>®</sup> responded positively. One preservice teacher shared, "I think they are definitely something that some students will perform better with, so if it works for them, I will surely use them. I would model it first and make sure students are comfortable with the procedures." Another stated, "Students need to have a variety of experiences. I would allow students with disabilities to use only if comfortable."

It also became clear through an evaluation of the students' written responses that a negative experience with the AlphaSmart 3000<sup>®</sup> in their pre-service class greatly increased the likelihood that the device would not be used in their future classroom. One student expressed the experience with the AlphaSmart

**Table 2**  
**Correlation Coefficients Likelihood of Use and Quiz Average and Experience**

	AlphaSmart Quiz Average	Experience Using AlphaSmart
Likelihood of Use	.34*	.51**

\* Correlation is significant at the .05 level

\*\* Correlation is significant at the .01 level

3000<sup>®</sup> as

... somewhat unfavorable just because I could not remember the whole question and it was not in front of me. I don't think the majority of students will like them, I didn't like the AlphaSmarts so I probably won't use them,

while a second student who stated they were happy to have received the experience of using the AlphaSmart 3000<sup>®</sup> stated, "But I wouldn't use it in my class." The reliability of the technology and the fear that it would fail was expressed by another student that shared, "I am used to pen and paper quizzes; I was uncomfortable with the AlphaSmarts. I was constantly afraid something would go wrong with my machine."

When asked, "As a teacher, what strategies would you use to incorporate the Alpha Quiz successfully?" those with a negative experience using the AlphaSmart 3000<sup>®</sup> responded negatively. One preservice teacher stated, "I think it was very frustrating and took more time than a paper quiz. I would use it for answering questions at different stations in my classroom but it won't be used for a quiz or test." Another participant comment included, "I would allow plenty of time because students with disabilities may really struggle since I did."

In response to research question #3, further investigation took place to see if actual quiz scores were affected using technology. A one-way analysis of variance was calculated

comparing AlphaSmart 3000<sup>®</sup> quiz grade to paper quiz grades; these results can be found in Table 3. There were no significant differences found in preservice teacher's quiz grade averages using either method. The use of the AlphaSmart 3000<sup>®</sup> as a test-taking tool did not have a positive or negative effect on the score a student received on a test. This conclusion is important for two reasons. First, many of the students in their written responses voiced concerns that the structure of the AlphaSmart 3000<sup>®</sup> would negatively impact their grades. Because of the limited size of the screen many students found trouble reading the question and scrolling down to find the answer. Two typical comments were, "Not being able to see the entire question and all the answers made it difficult to be able to make the correct decisions," and, "I found it difficult remembering the questions and answer choices because the screen was too small to fit the entire question and answer on it; therefore, I had to keep scrolling." While this was a widely held perception it was found to be not true and must be addressed as an issue. Second, the use of technology did not inflate test scores. An ongoing debate when it comes to the use of technology is to what extent, if any, does its use enhance or inflate test scores. As one student said, "I enjoyed the change. It wasn't any more or less difficult than paper and pencil. Another student summarized her experience with this comment: "One way or another, I either knew the information or didn't—regardless of how I took the quiz."

**Table 3**  
**ANOVA Comparisons between methods**

	Sum of Squares	<i>df</i>	<i>F</i>	Sig.
Between Groups	2.89	36	.87	.423

## Discussion

The purpose of this investigation was to take a learning-with-technology stance and provide preservice teachers an opportunity to experience technology during authentic learning activities. In addition, this study examined the perceptions of preservice teachers' use of technology and how it impacted their own academic performance. Specifically, the study probed the following questions: (a) Are there differences between actual and perceived success by pre-service teachers on traditional and technology delivered assessments? (b) When given the opportunity to learn and use technology, do such experiences impact the decision to use technology in their future classroom? and (c) Are quiz scores positively or negatively impacted by the use of technology?

The results of this study should be considered in light of limitations. First, a pretest/posttest design would have probed into pre-existing perceptions of technology use before using the AlphaSmart and provided a comparison for any perceptual change. Obviously, additional research and followup is needed concerning the longitudinal use and implementation of technology within the participants' actual classrooms.

## Outcomes and Benefits

The results of this study suggest a number of insights associated with the outcomes and benefits of the use and adoption of technology by preservice teachers: (a) a positive experience using the technology was related to the grade an individual received on a quiz; (b) a positive experience with the technology during their pre-service training influenced the student's decision to use the device in their future classrooms; and (c) the use of the technology as a test-taking tool did not have a positive or negative effect on the score a student received on a test.

The results of this study further support the importance of a positive experience when technology is being introduced to a pre-service teacher cannot be overstated. This study placed technology into the hands of preservice teachers. Participants were required to use technology to demonstrate their knowledge on chapter reading quizzes. Many felt their own academic performance was at stake. Findings of this study proved otherwise. Preservice teachers were given the opportunity to become engaged learners with technology and actively think about when and how they would use technology in their future classroom. Such engagement provided the opportunity to recognizing the advantages and disadvantages when utilizing technology for individuals within the learning environment.

While the use of technology greatly enhances the learning opportunities for all students, assistive technology devices for individuals with disabilities open up learning environments and opportunities that were once beyond the reach of these students. Inexpensive and easy to access devices, such as the AlphaSmart 3000®, allow individuals with disabilities to more equally participate in the learning environments in our schools today

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